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RESTORATION OF THE TITANOTHERE MEGACEROPS.

RICHARD S. LULL.

IN A recent study of a fine specimen of Megacerops discovered in the Bad Lands of South Dakota by an expedition from Amherst College, the author was impressed by several features which suggested a somewhat radical departure from the generally accepted restorations of these remarkable animals. The accompanying photograph from a model by the author aims to express his conception of the creature in the flesh.

The Amherst specimen was found in the Titanothere (White River) Beds about thirty-five feet above their base, in a place where practically all of the one hundred and eighty feet of the deposits were exposed. Hence it is reasonable to suppose that the remains represent a species not very primitive, nor yet showing the extreme of specialization exhibited by later forms, in other words a fairly typical titanothere.

The creature was of adult stature, though the vertebral epiphyses had not coössified with their centra ; but, as Marsh has shown, this feature, which one also finds in the elephants, implies the late maturity which is correlated with huge size.

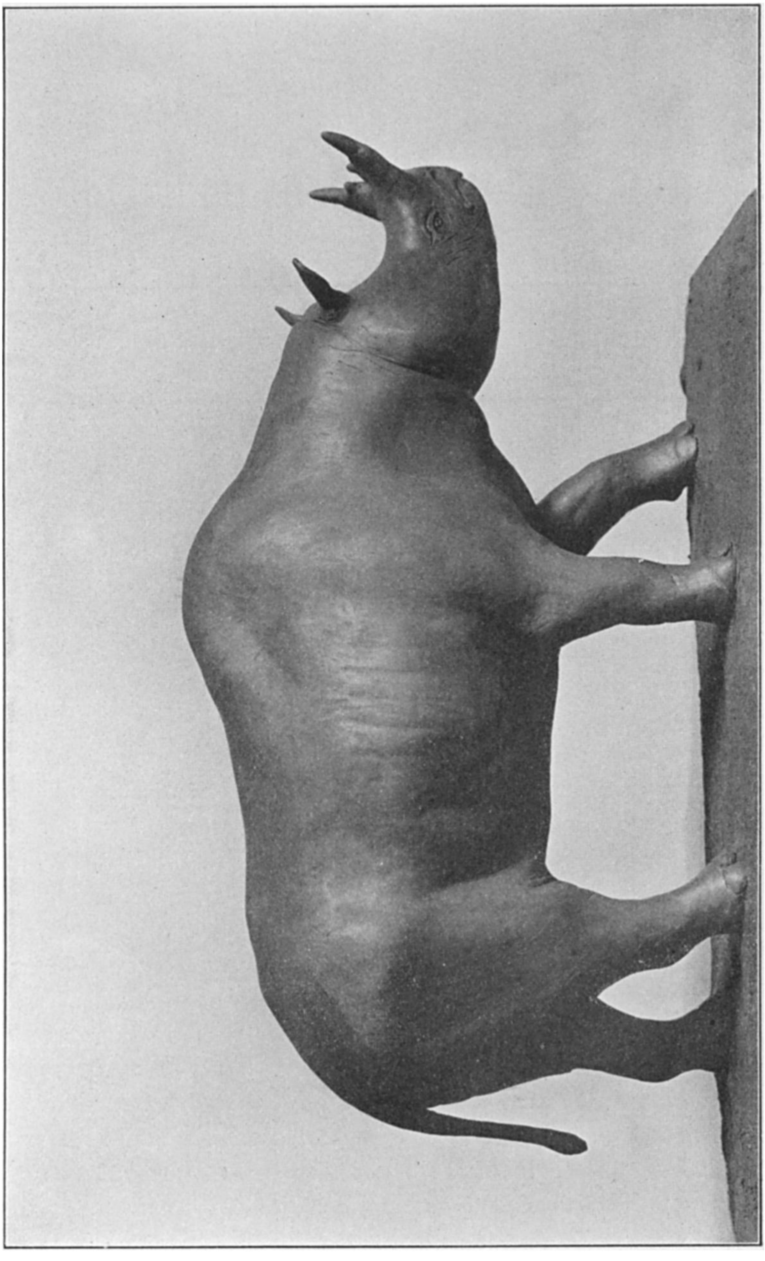

Fig. 1.— Restoration of the titanothere Megacerops, from a model by the author.

The full dentition had been acquired, the teeth being somewhat worn, which would seem to indicate an animal in its prime. The titanothere measured about seven feet four inches in height to the withers and a little more than twelve feet in length. Its weight was probably between one and a half and two tons.

The general proportions suggest the rhinoceros, though, while remarkably specialized as to dentition and the armament of the head, in other respects the titanothere is more primitive than any other perissodactyl, notably in the shorter back and in the structure of the fore foot.

The limbs are stouter than in the rhinoceros, especially at the wrist and ankle, and the degree of angulation between the various segments is less, probably to withstand the greater bodily weight. The fore limb is remarkably robust, and the great rougheninġs on the various bones, notably the humerus and the olecranon process at the elbow imply enormous muscular power. The fore foot is four-toed and symmetrical, with the main axis lying between the third and fourth digits as in artiodactyls. The retention of the outer digit would seem to imply that the great weight of the head and shoulders necessitated strength rather than a modification for speed. In the extremely flexible though strong wrist and the immense olecranon process one sees indications of a supple limb, a compromise between the pillar-like supporting limb of the elephant and one which would give its owner more agility in lying down or rising, or in charging its enemy.

The hind limb departs from the rhinoceros type mainly in the straightness of the upper segment whose bone, the femur, is long, without a conspicuous third trochanter, and with its shaft flattened fore and aft in such a manner as to imply that the strain brought to bear upon it during life was in the direction of its length. While the calcaneum is rather prominent, the limb must have been but little flexed at the ankle and almost straight when viewed from the rear; decidedly more elephantine than rhinoceros-like in general aspect.

The most notable feature of the trunk, aside from its relative shortness, is the great height of shoulder resulting from the elongated spines of the anterior dorsal vertebræ, which have well roughened extremities for the attachment of the ligamentum nuchæ and the huge muscles which supported the skull. Neither the rhinoceroses nor the elephants exhibit such a development as this and one is reminded irresistibly of the bisons in which the head becomes an offensive weapon of great power. Certainly this development implies more than the mere passive support of the head and is probably directly correlated with the development of the cranial armature.

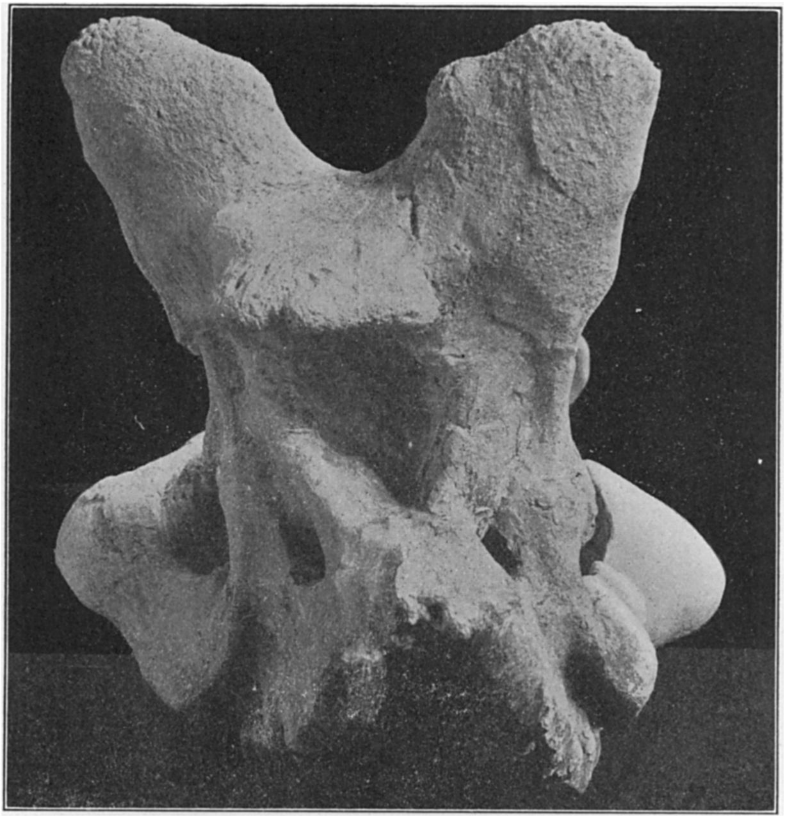

FIG. 2.— Anterior view of the skull of Megacerops, from a specimen in the Amherst College Museum.

Rhinoceroses charge their enemies, using the nasal horn with good effect, and here again there seems to be a direct relationship between the height and power of the shoulders and the degree of development of the horns. In the rhinoceros, however, the thrust is a vertical one, while in most titanotheres, notably in the one under consideration, there is evidence of strong lateral as well as vertical motion.

In the genus Symborodon the horn prominences are not connected by a web or bridge of bone as in this genus, Megacerops, which would indicate in the former an absence of lateral stress against the horns as though they were used more as in Rhinoceros. It would be interesting to note whether a comparative study of the skeletons would indicate the development or strengthening of special muscles in forms wherein the lateral stress obtained.

The titanothere skull is one of the most unique and bizarre among mammals, due to the development of the remarkable nasal prominences which bore the horns and the wide expanse of the zygomatic arch which, in the later types, became a broad shelf-like expansion of bone. The development of the zygomata and the height and breadth of the occiput seem to be directly correlated with the development of the horns, the necessity being to provide leverage for the effective use of these weapons.

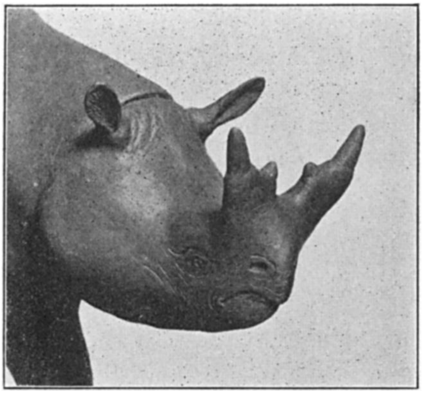

FIG. 3.— Head of the Megacerops restoration showing the nasal horns.

In the previous titanothere restorations the nasal prominences are always indicated as sheathed with horn, but a glance at the photograph of the skull will disclose the total absence of vascular impressions such as the horn cores of cattle and of the great horned dinosaurs (Ceratopsia) always exhibit. Another feature which is indicated in the figure is that the summit of each main prominence as well as those of the lesser secondary ones are curiously rugose resembling, though the rugæ are coarser, the roughened patches beneath the horns of the rhinoceros.

Thus one is led to doubt the probability of a horny sheath covering the entire prominence, yet the very mobility of the neck and the strength of the head-wielding muscles indicate the presence of an efficient armament of a size commensurate with the strength of its support. This together with the rugosities seems to point to the existence of horns formed, as in the rhinoceros, of agglutinated hair-like fibers; a larger pair upon the summits of the main, and, in this species, a lesser pair upon the secondary prominences.

This conception perhaps renders the creature somewhat more grotesque, but it would surely provide him with offensive and defensive weapons which with his evident prowess would make the titanothere peerless among the creatures of his time.

AMHERST, MASS.